

Weekly Report

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1 The texture-based event match approach

This week we implement the CK-distance and use it to match several selected patterns. As Figure 1 illustrated, the black rectangle marks the object and the red rectangles highlight the matched ones. When the object size (the time range of the object) is wide enough, the accuracy is acceptable. The detail will be described in Fangzhou's weekly report.

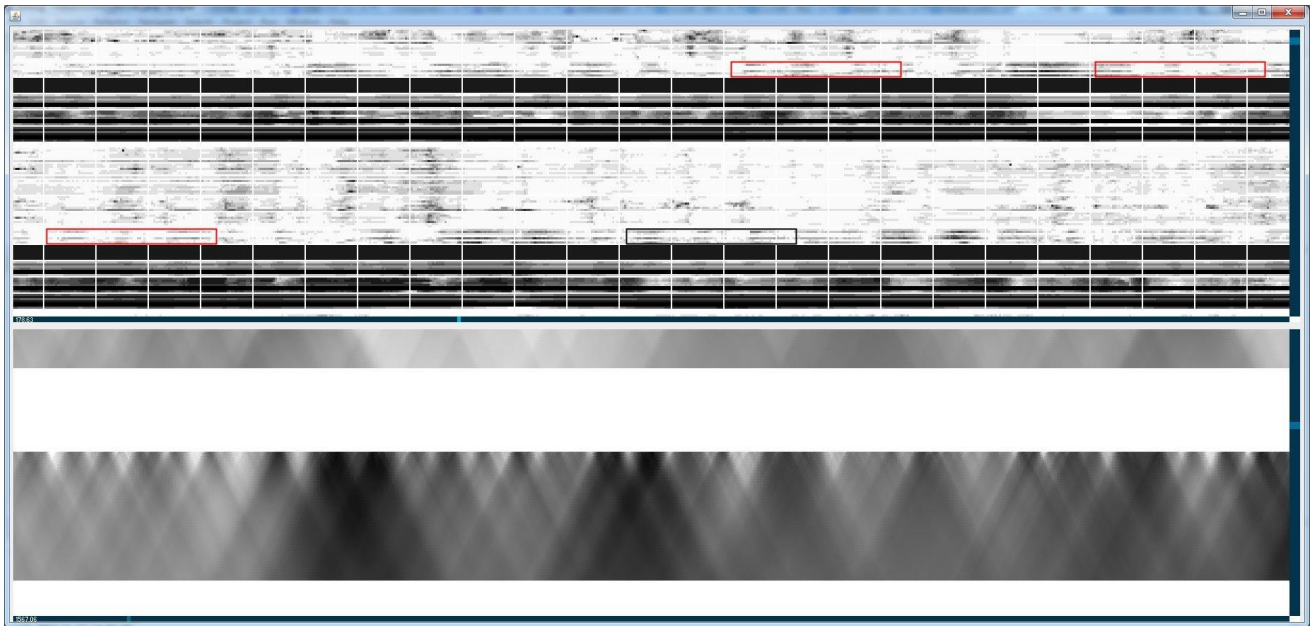


Figure 1 The matching result of CK-distance.

2 The transfer entropy

As I said several weeks ago, the information entropy or mutual information method considers the time-series as a sample points ignoring the time attribute. So this week I find the transfer entropy which defines an entropy rate which is the amount of additional information required to represent the value of the next observation of one of the systems. For example, if I have two time-series: the heart beat (T1) and the breath rate (T2). The T1 and T2 are obviously related to each other according to the mutual information. However, the dependency between heart and breath rate is hard to evaluate by $M(T1, T2)$ since the $M(T1, T2) = M(T2, T1)$. The transfer entropy calculates the unequal $TE(T1, T2)$ and $TE(T2, T1)$. Based on $TE(T1, T2)$ and $TE(T2, T1)$, we can see whether the heart rate influences the breath rate.

This theory suitable for time-oriented multivariate data. So far I only find one paper use transfer entropy in visualization [1]. [1] introduces this theory to visualize time-oriented multivariate volume data. In my opinion, this may be a way to find the dependency of each event.

4 Our jobs in the next week

Organize the ideas and survey the related work.

[1] Wang C, Yu H, Grout R W, et al. Analyzing information transfer in time-varying multivariate data[C]//Pacific Visualization Symposium (PacificVis), 2011 IEEE. IEEE, 2011: 99-106.